AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings of claims in the Application.

1.-7. (Cancelled).

8. (Currently amended) The apparatus of claim [[1]] 60, wherein each of the plurality of addressable cells includes an individually addressable cell.

9. (Original) The apparatus of claim 8, wherein the individual addressable cell includes a first individually addressable electrode and a second individually addressable electrode.

10. (Currently amended) The apparatus of claim [[1]] 60, wherein each of the plurality of addressable cells includes a pair of electrodes that are less than approximately 200 microns in size and the spacing of the electrodes is less than approximately 200 microns.

11. (Original) The apparatus of claim 10 wherein each of the pair of electrodes are less than approximately 100 nm in size.

12. (Original): The apparatus of claim 10, wherein the spacing of the pair of electrodes is less than approximately 100 nm.

13. (Original): The apparatus of claim 10, wherein each of the pair of electrodes includes at least one member selected from the group consisting of single-walled carbon nanotubes and silicon nano-wires.

14. (Currently Amended): An apparatus, comprising:

a microfluidic trench to contain one or more target molecules, an array addressed device including a plurality of addressable cells, each of the plurality of addressable cells including a

first electrode and a second electrode, wherein a first tip of the first electrode is located in the microfluidic trench and electronically coupled to a first trace via a first conductive plug and a second tip of the second electrode is located in the microfluidic trench and electronically coupled to a second trace via a second conductive plug;

a total internal reflectance prism optically-coupled to said microfluidic trench;

an electrochemical detector;

a Fourier transform infrared spectroscope optically coupled to the array addressed device, wherein the plurality of addressable cells comprise a plurality of sensor elements wherein each of the sensor elements is functionalized to interact with the one or more target molecules;

a control circuitry coupled to the sensor elements, wherein the control circuitry is configured to detect interactions of the sensor elements with the one or more target molecules, wherein the apparatus is a hand-held device and wherein the plurality of addressable cells is configured to function as a memory cell array.

15. (Original): The apparatus of claim 14, wherein the plurality of sensor elements are configured as a two-dimensional array and are addressable using memory cell techniques.

16. (Original): The apparatus of claim 15, wherein the plurality of sensor elements are addressable by corresponding rows and columns of the two-dimensional array.

17. - 18. (Cancelled)

19. (Currently amended) The apparatus of claim [[1]] 60, further comprising a microfluidic channel coupled to at least one of the addressable cells.

20. (Currently amended) The apparatus of claim [[1]] 60, further comprising a selective membrane coupled to at least one of the addressable cells.

21. (Original): The apparatus of claim 20, wherein the selective membrane includes at least one member selected form the group consisting of chemically selective membranes and biologically selective membranes.

22. - 53. (Cancelled)

54. (Currently amended) The apparatus of claim [[1]] 60, wherein the target molecule comprises DNA.

55. (Previously Presented): The apparatus of claim 14, wherein the one or more target molecules comprises DNA.

56. (Currently amended) The apparatus of claim [[1]] 60, wherein the electrodes are solid state electrodes.

57. (Currently amended) The apparatus of claim [[1]] 60, wherein the apparatus is configured to sense a change in a rate of electrolysis.

58. (Previously Presented): The apparatus of claim 14, further comprising a signal amplifier.

59. (Previously Presented): The apparatus of claim 14, further comprising a video display.

60. (New): An apparatus, comprising:

an array addressed device comprising:

a plurality of addressable cells, disposed as a column and row array, each of the plurality of addressable cells including first and second electrodes,

a plurality of first an second address lines,

wherein each said first electrode is electrically connected to a first address line and each said second electrode is electrically connected to a second address line,

wherein each of said first and second electrodes may be electrically biased;

a plurality of substantially parallel microfluidic trenches, wherein at least one said trench is aligned with and is in fluid communication with each row or column of said cell array;

an electrochemical detector electrically connected to said plurality of addressable cells;

a total internal reflectance prism optically-coupled to each said microfluidic trench;

a Fourier transform infrared spectroscope optically coupled to said prism; and

a CMOS chip comprising semiconductor devices and metallization electrically connected to said cell array.